

LISTING OF CLAIMS

For the Examiner's convenience, this Amendment includes the text of all claims under examination, a parenthetical expression for each claim to indicate the status of the claim, and markings to show changes relative to the immediate prior version of each currently amended claim. This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1 – 22 (Canceled).

Claim 23. (Currently amended): A reactor system for converting a tar sand feed into synthetic crude oil comprising:

- a) a fluidized bed reactor free of a contained catalyst bed and having a fluidized bed comprising substantially said feed,
- b) said reactor having a feed inlet for a fluidizable feed comprising a tar sand comprising a bitumen,
- c) said reactor having a fluidizing medium inlet for a gas comprising hydrogen, said fluidizing medium in contact with said fluidizable feed forms a fluidized feed,
said fluidized feed forming said fluidized bed in which said fluidized bed comprises at least said fluidized feed comprising said tar sand,
- d) ~~said reactor having a fluidized bed, e) said fluidized bed adapted for fluidization of said feed by said fluidizing medium,~~

- f) said reactor having an operating temperature in a range of about 50°F to about 1500°F or lower,
- g) said reactor having an outlet for a reactor product gas comprising a hydrocarbon,
and
- h) said reactor having an outlet for a solid.

Claim 24. (Previously presented): The reactor system of claim 23, further comprising:
a hydrogen recycling system positioned downstream of said gas outlet.

Claim 25. (Previously presented): The reactor system of claim 23, further comprising:
a separator which removes entrained solids from said reactor product gas.

Claim 26. (Previously presented): The reactor system of claim 25, having said
separator comprising a cyclone.

Claim 27. (Previously presented): The reactor system of claim 23, further comprising:
the feed inlet and the fluidizing medium inlet positioned for cocurrent flow of said
bitumen and said gas comprising hydrogen through said fluidized bed.

Claim 28. (Previously presented): The reactor system of claim 24, further comprising:
said hydrogen recycling system comprising a separating device for removing a portion of
said hydrocarbon from said reactor product gas producing a gas comprising a recycle hydrogen,
a recycle hydrogen gas stream,
a make-up hydrogen feed stream
a mixing device for admixing said recycle hydrogen and said make-up hydrogen feed to
form a hydrogen mixture,
a heater for heating at least said make-up hydrogen, and
a compressor for pressurizing at least the make-up hydrogen.

Claim 29. (Previously presented): The reactor system of claim 23, further comprising:
a heat exchanger to recover heat from a gas having a component which has exited said
reactor.

Claim 30. (Previously presented): The reactor system of claim 23, further comprising:
a gas-liquid separator for separating a condensable hydrocarbon having exited the reactor
as a reactor product gas.

Claim 31. (Previously presented): The reactor system of claim 30, further comprising:
a scrubbing system receiving a feed stream having a component which has exited said gas-liquid

separator.

Claim 32. (Previously presented): The reactor system of claim 23, further comprising:
a compressor having a recycle hydrogen feed and a make-up hydrogen feed.

Claim 33. (Previously presented): The reactor system of claim 32, further comprising
said compressor having a hydrogen mixture stream which provides a feed component to a heater.

Claim 34. (Previously presented): A reactor system for converting an oil shale into
synthetic crude oil comprising:

- a) a fluidized bed reactor free of a contained catalyst bed and having a fluidized bed comprising substantially said feed,
- b) said reactor having a feed inlet for a fluidizable feed comprising an oil shale comprising a kerogen,
- c) said reactor having a fluidizing medium inlet for a gas comprising hydrogen, said fluidizing medium in contact with said fluidizable feed forms a fluidized feed,
said fluidized feed forming said fluidized bed in which said fluidized bed comprises at least said fluidized feed comprising said oil shale,
- d) ~~said reactor having a fluidized bed comprising said feed,~~
- e) ~~said fluidized bed adapted for fluidization by said fluidizing medium,~~

- f) said reactor having an operating temperature in a range of about 50°F to about 1500°F or lower,
- g) said reactor having an outlet for a reactor product gas comprising a hydrocarbon,
and
- h) said reactor having an outlet for a solid.

Claim 35 (Previously presented): The reactor system according to either claim 23 or 34, further comprising:

a feed introducing system which provides said feed to said feed inlet with said feed comprising feed pieces having a dimension of about 1 inch or less.

Claim 36 (Previously presented): The reactor system according to claim 34, comprising a feed introducing system which comprises a device for separating pieces of feed material of a fluidizable size from pieces of feed having a size which is not fluidizable.

Claim 37 (Previously presented): The reactor system according to claim 35, comprising said feed introducing system comprising a screening device which removes pieces of said feed which have a dimension greater than about 1 inch from being fed to said reactor.

Claim 38 (Previously presented): The reactor system according to claim 34,

comprising a feed introducing system comprising a device for modifying the size of feed particles to achieve a particle of a size which is fluidizable.

Claim 39 (Previously presented): The reactor system according to claim 23, comprising said feed introducing system which maintains said feed at a feed temperature of about 100°F or lower.

Claim 40. (Previously presented): The reactor system of claim 34, further comprising: a hydrogen recycling system positioned downstream of said gas outlet.

Claim 41. (Previously presented): The reactor system of claim 34, further comprising: a separator which removes entrained solids from said reactor product gas.

Claim 42. (Previously presented): The reactor system of claim 41, having said separator comprise a cyclone.

Claim 43. (Previously presented): The reactor system of claim 34, further comprising: the feed inlet and the fluidizing medium inlet positioned for cocurrent flow of said kerogen and said gas comprising hydrogen through said fluidized bed.

Claim 44. (Previously presented): The reactor system of claim 40, further comprising:
said hydrogen recycling system comprising a separating device for removing a portion of
said hydrocarbon from said reactor product gas producing a gas comprising a recycle hydrogen,
a recycle hydrogen gas stream,
a make-up hydrogen feed stream
a mixing device for admixing said recycle hydrogen and said make-up hydrogen feed to
form a hydrogen mixture,
a heater for heating at least said make-up hydrogen, and
a compressor for pressurizing at least the make-up hydrogen.

Claim 45. (Previously presented): The reactor system of claim 34, further comprising:
a heat exchanger to recover heat from a gas having a component which has exited said
reactor.

Claim 46. (Previously presented): The reactor system of claim 34, further comprising:
a gas-liquid separator for separating a condensable hydrocarbon having exited the reactor
as a reactor product gas from a gas stream.

Claim 47. (Previously presented): The reactor system of claim 46, further comprising a scrubbing system receiving a feed stream having a component which has exited said gas-liquid separator.

Claim 48. (Previously presented): The reactor system of claim 34, further comprising: a compressor having a recycle hydrogen feed and a make-up hydrogen feed.

Claim 49. (Previously presented): The reactor system of claim 48, further comprising: said compressor having a hydrogen mixture stream which provides a feed component to a heater.

Claim 50. (Currently amended): A reactor system according to claim 23, further comprising

said feed comprising a tar sand having a piece size capable of passing through a one inch mesh,

said fluidized bed comprising said feed and fluidized by said gas comprising hydrogen, said reactor having an operating temperature of about 1000 °F or lower and an operating pressure of 450 psi or greater,

said gas comprising hydrogen fed to said reactor at a temperature of about 1500 °F or lower,

said reactor system adapted to recycle a gas comprising hydrogen, and

said reactor system adapted for control of a methane level by having a gas purge.

Claim 51. (Currently amended): A reactor system according to claim 34, further comprising

said feed comprising an oil shale having a piece size capable of passing through a one inch mesh,

said fluidized bed comprising said feed and fluidized by said gas comprising hydrogen, said reactor having an operating temperature of about 1000 °F or lower and an operating pressure of 450 psi or greater,

said gas comprising hydrogen fed to said reactor at a temperature of about 1500 °F or lower,

said reactor system adapted to recycle a gas comprising hydrogen, and

said reactor system adapted for control of a methane level by having a gas purge.

Claim 52. (Previously presented): The reactor system of claim 23, further comprising: the feed inlet and the fluidizing medium inlet positioned for countercurrent flow of said bitumen and said gas comprising hydrogen through said fluidized bed.

Claim 53. (Previously presented): The reactor system of claim 34, further comprising:
the feed inlet and the fluidizing medium inlet positioned for countercurrent flow of said
kerogen and said gas comprising hydrogen through said fluidized bed.

Claim 54. (Previously presented): The reactor system according to claim 34,
comprising said feed introducing system which maintains said feed at a feed temperature of about
100°F or lower.